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$$= \frac{NK^2 - BK^2}{MK^2 - BK^2}.$$

$$\therefore NK^2 \cdot MK^2 - NK^2 \cdot BK^2 = NK^2 \cdot MK^2 - MK^2 \cdot BK^2.$$

$$\therefore NK^2 \cdot BK^2 = MK^2 \cdot BK^2.$$

$$\therefore NK = MK.$$

II. Solution by F. E. MILLER, A. M., Professor of Mathematics, Otterbein University, Westville, Ohio, and P. C. CULLEN, Indianola, Neb.

K the mid-point of chord AB , and CD and EF chords through K .

To prove that the joins CF and ED meet AB equidistant from K .

Through A and B draw circles $C' \equiv C$ and produce CD and EF to C' and F' .

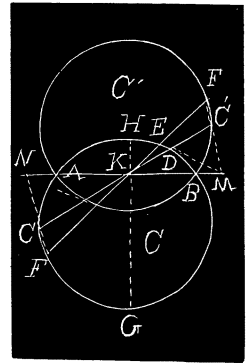
From symmetry we see that FC and $F'C'$ meet AB equidistant from K and are parallel.

$\angle EDC = \angle EFC = \angle EF'C'$ and hence $EDC'F'$ are concyclic. Then is $F'C'$ and ED meet in M , $MD \cdot ME = MC' \cdot MF'$, or the tangents from M to the circles C and C' are equal and therefore M is on the radical axis, i. e. on AB .

$$\therefore NK = MK.$$

Again by projection.

Project circle C on a plane through AB so that the projection of HG perpendicular to AB may have the projection of K as its mid-point. Then the circle becomes an ellipse with K as center and CD and EF as diameters, and ED and FC meeting the major axis AB equally distant from the center K . But points on AB are not changed by the projection. Therefore N and M are always equidistant from K .



A second solution by Analytical Geometry was furnished by Professor Zerr.

CALCULUS.

104. Proposed by M. E. GRABER, Heidelberg University, Tiffin, Ohio.

Find the differential equation corresponding to $\sqrt{1-x^2} + \sqrt{1-y^2} = [a(x-y)]$.

Solution by G. B. M. ZERR, A. M., Ph. D., The Temple College, Philadelphia, Pa.; COOPER D. SCHMITT, A. M., University of Tennessee, Knoxville, Tenn.; and the PROPOSER.

$$\sqrt{1-x^2} + \sqrt{1-y^2} = a(x-y) \dots (1).$$

$$x dx / \sqrt{1-x^2} + y dy / \sqrt{1-y^2} = a(dy - dx) \dots (2).$$

Eliminating a between (1) and (2) and reducing we get

$$\begin{aligned} & \{xy - 1 - \sqrt{(1-x^2)(1-y^2)}\} \{\sqrt{1-y^2} dx \\ &= \{xy - 1 - \sqrt{(1-x^2)(1-y^2)}\} \sqrt{1-x^2} dy. \end{aligned}$$

$$\therefore dx/dy = \sqrt{1-x^2} / \sqrt{1-y^2}.$$